

DOCUMENT RESUME

ED 380 061

IR 016 982

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TITLE Applying Principles of Visual Literacy to the Design of Distance Education Materials for Correctional Use.
PUB DATE [95]
NOTE 8p.; In: Imagery and Visual Literacy: Selected Readings from the Annual Conference of the International Visual Literacy Association (26th, Tempe, Arizona, October 12-16, 1994); see IR 016 977. Figures contain small broken print.
PUB TYPE Speeches/Conference Papers (150) -- Information Analyses (070)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Correctional Education; *Courseware; *Distance Education; Educational Strategies; Formative Evaluation; *Instructional Design; Instructional Effectiveness; Problems; Program Development; Screen Design (Computers); Secondary Education; *Telecourses; Visual Learning; *Visual Literacy; Workbooks
IDENTIFIERS Concept Mapping; Generative Processes; Pennsylvania

ABSTRACT

This paper examines the conceptualization and design of the Pennsylvania Audiographics Distance Education Project's (PADEP) Life Skills and Drug Education Course, and discusses the successes and difficulties of the project based on results from formative evaluation. Educators from Harrisburg, Pennsylvania, developed new courses that could be delivered to youth in correctional schools using teleteaching technologies. It was determined that the instructional design would be based on relevant literature in the field of visual literacy. Concept mapping and generative learning, a visual instructional strategy, were selected for instructional design. The screen design of the slides and layout of the workbook were also created with visual literacy in mind. Evaluation of the program indicated that the lessons were effective, learners adopted the instructional techniques, and appreciated the extra structure and the ability to interact with a computer. Some of the problems included: the software was antiquated, and the correctional school teacher who was working on the development of the course and workbook resigned. (Contains 25 references.) (DGM)

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Applying Principles of Visual Literacy to the Design of Distance Education Materials for Correctional Use

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC).

This paper concerns the application of visual literacy principles in the design of a distance learning project. Specifically, this paper will examine the conceptualization and design of the Pennsylvania Audiographics Distance Education Project's (PADEP) Life Skills and Drug Education course. Additionally, this paper will discuss the successes and difficulties of the project based on results from formative evaluation.

The Conceptualization

In September, 1993, a group of educators met near Harrisburg, Pennsylvania to discuss the development of new courses that could be delivered using teleteaching technologies. The group had previously agreed to use a specific teleteaching system known as teleteaching audiographics.

The Equipment and Set-up

The selected audiographics system, as illustrated in figure one, can include two or more sites that are equipped with a personal computer (DOS platform) and 9600 baud modem, a speaker phone, an audiographics software application, and two phone lines.

This equipment allows for the creation of an audiographic network. This particular

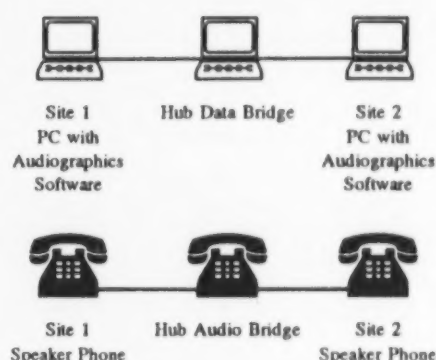


Figure One:

The basic set-up for the audiographics teleteaching network used by the Pennsylvania Audiographics Distance Education Project. Each site has one personal computer with 9600 baud modem, one speaker phone, audiographics application software, and two phone lines.

type of network requires that each site be equipped with two, voice-grade telephone lines: one dedicated to voice transmission through a speaker phone and the other linking the personal computers by modem.

The audiographics software application, used by the PADEP, can be run on a 286 machine. A Windows version of the software does not exist. The computers are equipped with 14" VGA monitors and 9600 baud modems. The audiographics software provides the interaction between sites.

Audio and data bridges are located at a central site through which all audio and data transmissions are received and sent to each site simultaneously. The hub selected for this project is capable of supporting 8 simultaneous users.

With this particular software application, each lesson takes the form of a slide show. Each slide is saved as a separate file on a disk. Slides can then be organized to be delivered linearly or non-linearly.

Once connections are made, each site can see and interact with the same slides at the same time. Voice interaction is also possible through the speaker phones.

Youth Correctional Facilities

The adoption of this system stemmed from a need to address the specific learning needs of troubled youth. The group of Pennsylvania educators discussed the concern that youth oriented correctional agencies across the country are struggling to meet educational needs despite dwindling resources. Often these correctional agencies identify an educational need which would benefit only a few clients or even one individual. Meeting the needs of a few hampers the efforts to meet more general requirements of other clients.

More commonly, schools identify educational needs with sufficient numbers of potential learners and develop and integrate specialized courses into their curriculums to meet those needs. As a result, many schools meet one specialized need and are forced to ignore the rest.

The group of Pennsylvania educators agreed that audiographic distance education would enable correctional and mainstream schools to economically share their resources

so that educational needs are more efficiently and effectively met.

A representative from one the youth correctional facilities announced that his organization would develop a 40-day audiographic instructional unit on life skills and drug education. The course would be offered to other schools which were represented in the group.

The Design of the Project

Taking a Visual Approach

This author was selected as the principal investigator and instructional designer for the project. It was determined that, due to the visual nature of the medium, the instructional design would be based on relevant research in the field of visual literacy.

By its very nature, audiographics distance education is a highly visual technology. Research has shown that many learners are visually oriented and that such individuals benefit more from visually oriented learning strategies (Dwyer, 1972; Lesgold, McCormick, and Goinkoff, 1975; Carnine and Kinder, 1985).

Defining visual literacy is a difficult task that results in more disagreement than consensus (Herring, 1980; Seels, 1994). However, the concept can be narrowed into three constructs which allow for a more tangible approach (Randhawa, 1978; Seels, 1994). Randhawa identifies these three constructs as visual thinking, visual learning, and visual communication. The design of the Life Skills and Drug Education course centered around these three constructs.

Visual thinking refers to the mental imagery of visual concepts (Seels, 1994) and strongly relates to the internal mediational

processes which each learner brings to the analysis of visual stimuli (Lenze and Dwyer, 1993). The argument can be made that visual learning cannot take place until visual thinking has been initiated by the learner.

Visual learning refers to learning from visuals and the design of visuals for instruction (Seels, 1994). This concept relates to much of the research dealing with imagery.

Paivio's (1979) concept of visual imagery relates memorability to concreteness. Concepts which are more concrete in nature, like "tree", are more easily visualized mentally and more easily remembered than more abstract concepts like "discretion."

According to Paivio's (1979) theory, once concrete images are established within the learner's memory, they will act as hooks on which other ideas are connected. This is what Gambrell and Bales (1986) refer to as associative learning, and it forms the basis for a learning theory known as concept mapping. *Concept mapping* will be discussed later in this paper as an instructional strategy.

Visual communication is the last construct. It refers to the expression of the ideas through visual means (Seels, 1994). How well these ideas are communicated and received involves the interaction of visual thinking and learning. This is the heart of visual literacy.

Since audiographics is limited in what it can express verbally, emphasis has been placed on visual communication. The speaker phone is the only means of oral communication. Such communications can be confusing without a sufficient visual reference. Because of this, the computer screen and print materials became very important to the design of the Life Skills and Drug Education course. It was decided

that both the screen design and the workbook design would be visual in nature. Ideas would be communicated visually whenever possible.

It is hoped that by emphasizing visual communication strategies, visual learning will occur and facilitate visual thinking. Of course the ultimate hope is that the instruction would succeed and the learners would come to understand basic life skills and the dangers of illegal drug use.

Concept Mapping

Concept mapping is an instructional strategy that relies on the idea that in order for learners to grasp concepts, those concepts must first become integrated into existing memory (Ault, 1985). Since concepts which are more concrete are easier to integrate, instruction must begin by presenting the learners with concrete images and concepts.

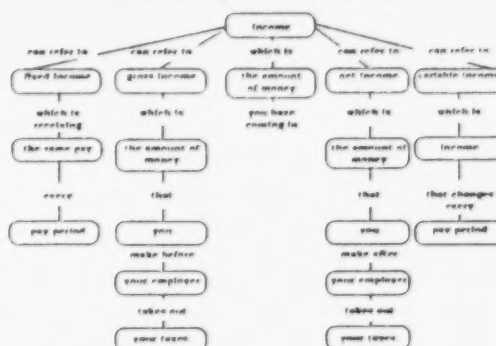


Figure Two:
An example of a concept map.

Once these concrete concepts are established in the learner's memory, additional concepts can be attached, or mapped onto the new concrete concepts. The result is a series of concepts which are mapped together on an outward flowing continuum of concrete to abstract concepts and which are successfully integrated into pre-existing memory (Ault, 1985).

One of the first lessons in the course

is centered around concept mapping. In this lesson learners are taught to identify the important concepts from a short instructional text. They then write these concepts on a piece of paper. They are then told to draw a line between any of the concepts which are related in any way. On these lines they write the relationship. When finished they have a map of concepts which provide them with a visual form of the ideas. A sample concept map is shown in figure two.

Generative Learning Strategies

In addition to concept mapping, a visual instructional strategy was selected. This strategy is based on generative learning techniques (Wittrock, 1974, 1978, 1981, 1990; Wittrock and Carter, 1975).

Generative learning is a process oriented cognitive processing model in which the learner generates relations "(1) between the text and the learner's knowledge and memories and experience, and (2) among the units of the text, such as words, sentences, and paragraphs" (Peled and Wittrock, 1990), p. 175). The basic premise of generative learning is that learners will more easily recall images and concepts that they themselves generate as opposed to images and concepts generated by the instructor or instructional text.

In the Life Skills and Drug Education course, students are presented with a visual representation of a concept. They are told to imagine that concept in their head and then copy it onto a diagram in their workbook. Gradually, students copy additional visuals into their workbook until the total image is complete. Figures three through seven show the progression of such an activity involving the parts of the brain.



Figure Three:
Outline of brain as seen in learner's workbook.

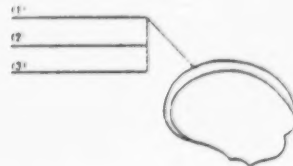


Figure Four:
Second outline of brain as seen on the computer screen. The outer layer is drawn in and learners are asked to copy it onto their diagrams.

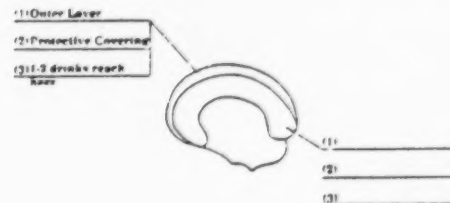


Figure Five:
Third outline of brain as seen on the computer screen. The cerebrum is drawn in and learners are asked to copy it onto their diagrams.

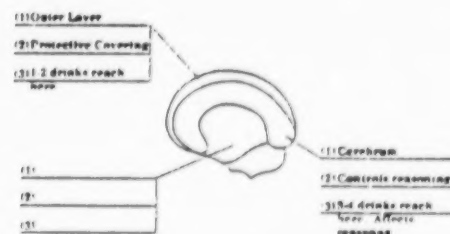


Figure Six:
Fourth outline of brain as seen on the computer screen. The middle brain is drawn in and students are asked to copy it onto their diagrams.

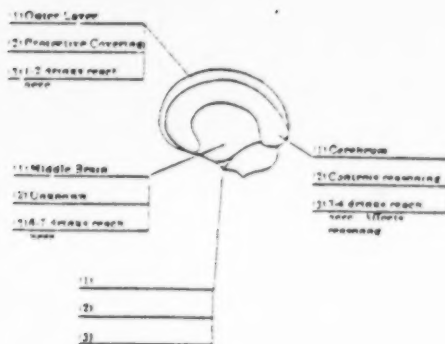


Figure Seven:
Fifth outline of brain as seen on the computer screen. The medulla is drawn in and learners are asked to copy it onto their diagrams.

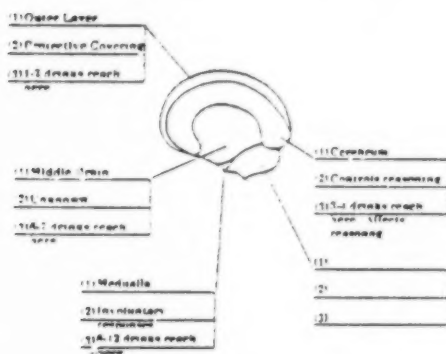


Figure Seven:
Sixth outline of brain as seen on the computer screen. The cerebellum is drawn in and learners are asked to copy it onto their diagrams.

Notice that each diagram is connected to three blank lines. On the first line students label the particular part of the brain. On the second line learners write in the function of that part, and on the third line they write in the number of drinks an average individual would need to consume to affect that part of the brain.

Additional Visual Design Strategies

Visual design strategies were not limited to the design of instructional activities. The

screen design of the slides and the layout of the workbook were also created with visual literacy in mind.

Lenze (1992) states that there is a cognitive rationale for structuring text. This rationale is based on mathemagenic and parsing theories (Baddaley, 1986; Gagne', Briggs, & Wager, 1988; Rothkopf, 1966, 1970; Stine, 1990). Such structuring guides the learner through the text and separates information into meaningful and related parts.

Most notably, text accents have been inserted into the text to cue learners to important words and phrases. Important words are listed in italics. Any word in italics can be looked up in the glossary of the workbook. Important phrases, such as those which need to be recalled for quizzes, are in bold text. In the course, learners are provided with early instruction as to what these accents signify and how to use them to learn from the text.

Finally, visuals are included in the workbook and slides whenever possible. Research has shown that the use of visuals in instruction is very beneficial when appropriately used (Dwyer, 1978; Pettersson, 1989).

Successes and Failures

Although this project is still in the formative stages, some interesting information has already been learned.

The software application, which is used in this project, was not selected by this author and should have been rejected as antiquated before the project began. There are several major problems with the package including:

- A primitive graphics capability.
- The ability to work with only one out-

- dated model of scanner.
- Limited selection of fonts.
- Poor legibility.
- Awkward user interface.
- Expensive.

Additionally, it was originally hoped that the workbook could be designed with the help of the course instructor. The course was developed from the work of a teacher at the correctional facility. That teacher, however, resigned her position at the school during the development of the project. Her replacement held the position for a short time and was then transferred to another position. His replacement was enthusiastic about the project but due to his late arrival he was not able to provide much to the project in the way of design.

There is some good news. A few of the lessons have been subjected to formative evaluation and have proven to be quite effective. Learners adopted the instructional techniques and appreciated the extra structure and the ability to interact with a computer.

One of the strengths of visual literacy research is that so much of it is having an impact on actual instruction. It is hoped that visual literacy will have as great an impact in the area of distance education as it has in so many other fields of study.

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